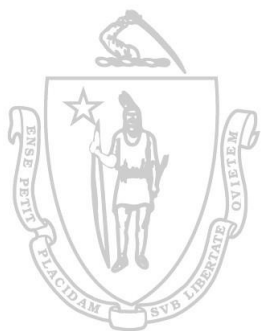


WHAT TO
EXPECT WHEN
**STATISTICAL
SAMPLING**

**COMMONWEALTH OF MASSACHUSETTS
AUDIT DIVISION**



Introduction

The goal of all Department of Revenue (DOR) audits is to determine whether or not the correct amount of tax has been paid during the audit period. To do that, we review your books and records.

Since records are increasingly stored in electronic format, we can more readily assess the accuracy of your tax reporting by examining the electronic records and dramatically reduce the volume of paper documents needed for the audit.

This brochure will help you understand what to expect as we review your electronic records by giving you an overview of the Statistical Analysis Method (SAM).

What is Statistical Analysis Method?

We will employ a technique called stratified random sampling when examining voluminous (i.e., greater than 3,000) records. You supply us with electronic data that we then analyze using specialized software such as ACL. We may provide guidance and work with your information technology staff in order for them to download this data in a format we can use (XLS, XLSX, MDB, MDBX, DBF, CSV, TXT).

What are the benefits of a statistical sampling?

Businesses usually find this method less time-consuming and more convenient than a detail examination whereas statistical sampling audits require the retrieval of fewer source documents such as invoices. This saves the time and expense of document retrieval which minimizes the disruption to the business. You can expect to experience an audit which is more accurate and requires fewer resources.

Must I participate in statistical sampling?

Generally, yes. Chapter 62C S24 grants the Commissioner broad authority to use sampling methods. The auditor will try to assist you in establishing the proper sampling method.

Am I required to provide electronic records?

Yes. If your records are maintained electronically, 830 CMR 62C.25.1(3)(c) requires you to provide them electronically.

What will the auditor need to know about my electronic records?

At the commencement of any audit, we need to ascertain your business operations and record keeping procedures. For a computer-assisted audit, we will ask:

- What electronic records do you have?
- In what format are your records available?

- What periods are the records available for?
- Have there been any significant changes in your accounting systems?

We will also need to:

- Understand the accounting system and sales/purchasing processes.
- Determine which fields in those files contain the critical information.

You will be asked to provide a table layout containing all available fields and descriptions of codes in addition to an electronic chart of accounts. This will help us determine which fields contain the information that is critical for us to examine your records. Your IT staff will be asked to create one composite file containing all of the fields needed to complete the audit. Composite files expedite the audit process with fewer data conversion problems.

Are my records kept confidential?

You are protected by the Commonwealth's confidentiality laws, which prevents any unauthorized disclosure of taxpayer information. Massachusetts Law (M.G.L. Ch.62C, section 21) specifically prohibits taxpayer data from being used for purposes other than its intended use. Media (such as CDs, DVDs, etc.) are destroyed once the data is downloaded. Flash drives will be returned upon request. We electronically archive all audit records until the record retention deadline is met after which the records are destroyed.

What are the steps in a statistical sampling audit?

Step 1: Discuss your records at the opening conference

An opening conference is the meeting that occurs prior to the commencement of the examination. During the conference, the items to be discussed will include: general audit procedures, availability of and access to records including electronic records, examinations suitable for sampling, data transfer process, verification of data, timeframes for furnishing and reviewing records.

Step 2: Evaluate data integrity

The data you provide must be examined for accuracy and completeness. This is accomplished by reconciling the electronic data with your books and records. We will ask you to review your data and provide all additional records needed

SUMMARY OF DATA

PERIOD	ACCT #	VALUE
12/08	12345	\$6,500
12/08	23456	\$7,250
12/08	34567	\$8,107
12/08	45678	\$6,823
12/08	56789	\$4,426



TRIAL BALANCES

VALUE	ACCT #	PERIOD
\$6,500	12345	12/08
\$7,250	23456	12/08
\$8,107	34567	12/08
\$6,823	45678	12/08
\$4,426	56789	12/08

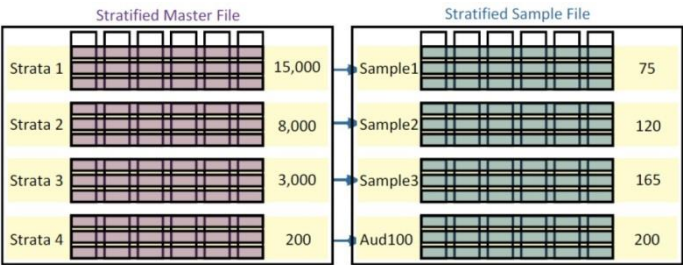
to reconcile any differences.

Step 3: Refinement of the sample population

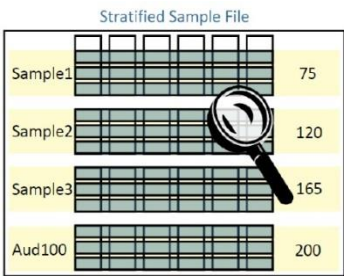
In order to sample only transactions with tax implications, it is important to discuss with your auditor methods to refine the sampling population. Some common examples of data purification are: exclusion of non-Massachusetts sales, payroll accounts, offsetting debits and credits and voided transactions. If the refined population totals over 3,000 records, it is eligible for statistical sampling.

Step 4: Selecting the sample

The refined population is divided into segments called strata based on the dollar value of the transactions. The top-tier strata is reviewed in detail thereby offsetting the effects of extreme values on the sample population.



Upon selection, the sample is immediately analyzed to ensure that it meets our validation standards. The sample must achieve confidence of 95% and precision of $\pm 3\%$. If the sample validation fails, another sample is automatically selected until a valid sample is produced. The sample must pass validation before it is provided to the auditor.



Step 5: Compute and apply the error rate

Each transaction within the sample is examined by the auditor to determine taxability and the taxable amount of error. The total errors for each stratum are divided by the corresponding stratum sample amount. The resulting error rate is applied to the corresponding stratum population to arrive at the projected stratum error. The *sample adjusted error rate* is computed by dividing the sum of the projected stratum errors by the sample population.

The sample adjusted error rate is applied to the population value by filing period. In instances where the population represents only a portion of the audit period, an *overall error rate* is calculated by including the top-tier (detail) strata values and is applied to the non-sampled periods.

What statistical sampling standards do you use?

Confidence interval and precision

Confidence interval is a statistical measurement that is used to measure the sampling estimate. It is the probability that the selected sample reflects the true population in terms of standard deviation with 95% confidence.

Precision is the allowance for deviation in value of the selected transactions from the sample mean value. This ensures that mathematical anomalies are not selected from within the sampling stratum. Our standard precision interval is $\pm 3\%$.



Minimum sample size

We employ the use of a minimum sample size, which is to say: each strata will have no less than 30 transactions sampled. This ensures that we examine enough transactions within each strata to deem an acceptable examination.

Establishing a “ceiling”

In order to eliminate the effects of extreme values, the top-tier strata is reviewed in detail. This breakpoint is set anywhere from the ninety-seventh percentile to the ninety-nine-point-fifth percentile, depending on the number and distribution of values within the population.

Imposing a “floor”

Though uncommon, we may use a cut-off value based on the bottom-tier strata of the population. That cut-off is excluded from examination, though it is subject to the error rate projection. Depending on the number and distribution of the values within the population this breakpoint may be necessary to produce an efficient sample.

Statistical Methodology

This section of the brochure describes the methodology utilized by DOR for statistical sampling tax audits.

Efficiency Factor Methodology

To reduce the overall variance of the population and to ensure statistical efficiency a balance is struck between stratification and detail cutoff. The marker of improved overall variance is termed the efficiency factor. It is a calculation of system variance reduction due to stratification and detail cutoff as compared to a simple non-stratified sample with no detail cut-off. The stratification efficiency calculation is based on that discussed in Statistical Methods by G.W. Snedecor and W.G. Cochran.

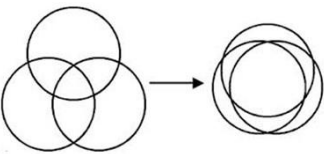


Sample Size Methodology

Typically the upper tier strata are characterized by very large standard deviations but relatively low in population frequency. Audit employs a modified Neyman Allocation as endorsed by Yan Liu, Mary Batchter and Fritz Scheuren (Journal of Data Science 3(2005), pp. 213-222. In its derivation this allocation formula contains only X (and not Y) so it can be implemented at the design stage. In other words, this method happens seamlessly during the staging of the sample. This method results in slightly larger sample of the upper tier strata to further reduce the statistical volatility of those transactions.

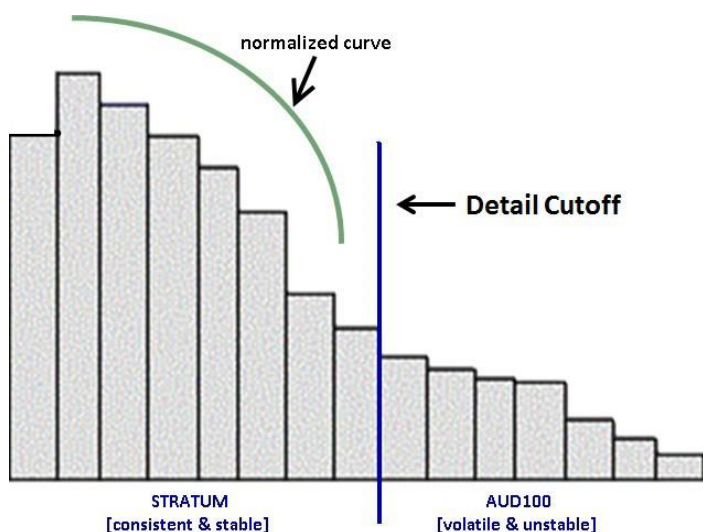
Midpoint Assessment Methodology

Audit assesses the error rate at the midpoint. In probability theory, the Central Limit Theorem (CLT) states that, given certain conditions, the arithmetic mean of a sufficiently large number of iterates of independent random variables, each with a well-defined expected value and well-defined variance,

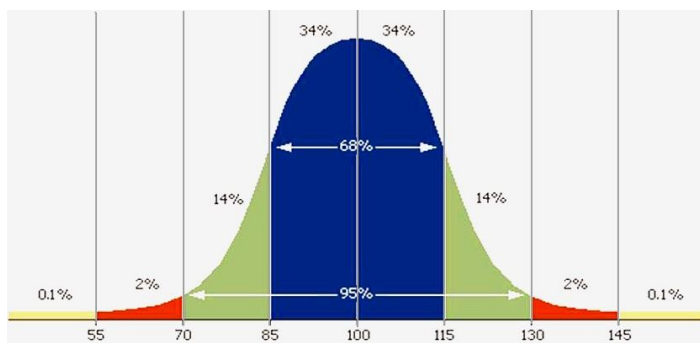


will be approximately normally distributed. As such, transactional values converge on the population mean.

Sample Population Smoothing—illustrated



Midpoint Assessment & Central Limit Theorem—illustrated



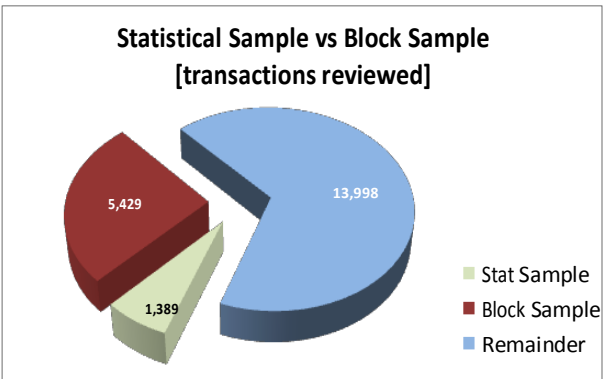
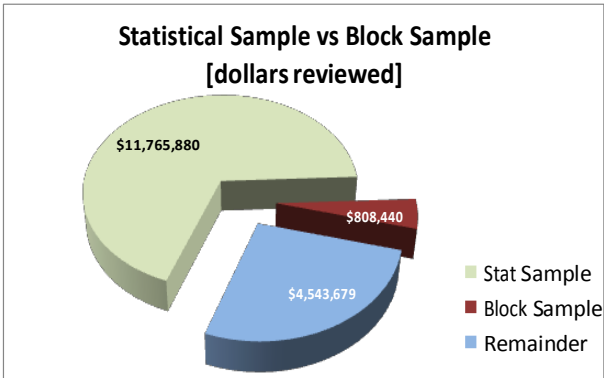
Can multiple sampling methods be used in an audit?

Yes. In instances where your accounting systems have changed dramatically and the record layouts are incompatible, it would be appropriate to draw a separate statistical sample from each population. Additionally, it is possible to have a statistical sample performed on expenses while block sampling sales.



Is statistical sampling better than block sampling?

Statistical sampling is more efficient and has proven to be more accurate than other sampling methods as illustrated by the example below.



By stratifying the population and reviewing the top-tier strata in detail, we are able to examine nearly 70% of the total dollars while sampling less than 7% of the total records. In contrast, when using the block sampling method on the identical population, less than 30% of the total dollars are reviewed while sampling more than 25% of the total records. **This example is for illustration purposes only and resulting samples will vary.**

Will sample selection delay the audit process?

When the population is refined as described in this brochure, an auditor can expect a sampling package well within two weeks and often within two business days of their request.



Electronic Auditing

Whenever possible, an electronic detail audit is the preferred technique for a review of sales. This method will make it possible to review every transaction in the file, precluding the need to sample and project the results. The detail review eliminates disagreements and appeals regarding projections and extraordinary transactions.

Using electronic files, the auditor may be able to filter the taxpayer's sales population leaving a manageable number of non-taxed transactions to review. Some transactions that might be eliminated are:

- Sales shipped out of state
- Sales that are taxed correctly
- Sales of non-taxable products
- Sales supported by valid exemption certificates

The remaining population includes the sales that should be questioned further and assessed against if appropriate. If the files are too large to be opened in Excel 2010, your SAM agent can assist with reading the files and filtering. However keep in mind that there may be some sales tax audits that lend themselves better to block or statistical sampling.



Frequently Asked Questions

If I don't like the results from the initial sample, can I request a redraw of a new sample?

No. Once a sample is validated and presented to the taxpayer, it should not be redrawn. This introduces bias into the process. However, if a taxpayer receives a sample containing items that were mutually agreed to be removed from the sampling population, then a new sample can be redrawn.

How are credit transactions treated in Statistical Sampling?

By default, credits occurring in the sampling population are treated with absolute value and may be selected in the random sample. During the population refinement, you may remove all offsetting debits and credits from the sampling population.

Can a sample be drawn at the invoice level rather than at the line-item level?

Yes. If your data can be summarized from the line-item level to the invoice level (i.e., there must be at least an invoice number and an invoice date) then the population can be summarized to the invoice level and then a sample can be drawn.

How do I treat the credit transactions in my audit periods?

SAM uses the absolute values of transactions in calculating a stratified random sample; therefore it is not necessary to exclude all credits. However, you may elect to exclude all offsetting debits/credits (duplicates by absolute value) from the sample population. Excluding credits from a sample population does not mean that you should not review them in whole or in part.

Can certain accounts be selected for sampling?

The auditor will pre-screen the data provided to identify accounts that do not need to be included in the sample population. The auditor may need to ask specific questions about a particular account or transaction type to determine if it can be excluded from the sample population. In addition, an extract may be requested to determine whether a certain account or transaction type can be eliminated from the sampling population.

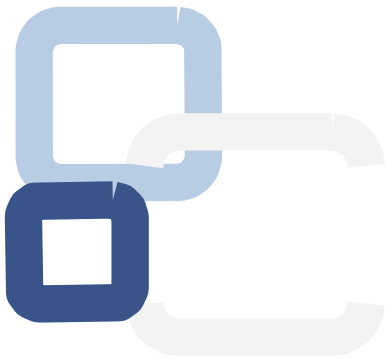
For more information

For more information on audits in general, please visit www.mass.gov/dor/audit-info.

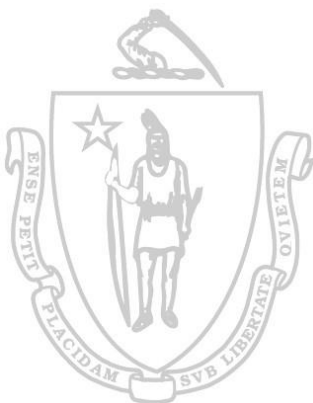


A Guide to the Massachusetts Department of Revenue: Your Taxpayer Bill of Rights

<http://www.mass.gov/dor/individuals/taxpayer-help-and-resources/tax-guides/guide-to-dor>



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